

The Climate Literacy and Energy Awareness Network (CLEAN)

Kathryn Boyd¹, Anne Gold², Frank Niepold³, Susan Lynds⁴, Amanda Morton⁵, Monica Bruckner⁶, Cheryl Manning⁷, Patrick Chandler⁸, Tamara Ledley⁹, and Karin Kirk¹⁰

¹Cooperative Institute for Research in Environmental Sciences

²CIRES/CU Boulder-Rsrch Lab 2

³NOAA Washington DC

⁴Univ Colorado

⁵CIRES

⁶Carleton College

⁷Albert Einstein Distinguished Educator Fellowship Program

⁸University of Colorado at Boulder

⁹Bentley University

¹⁰Freelance Educational Writer

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Abstract

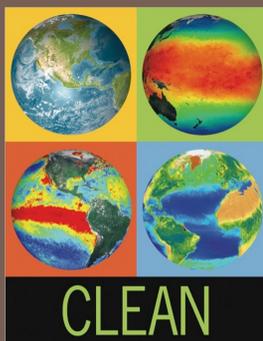
It is important that we prepare tomorrow's scientists, decision makers, and communities to address the societal impacts of a changing climate. In order to respond to, manage, and adapt to those changes, citizens of all ages need accurate, up-to-date information, knowledge of the sciences, and analytical skills to make responsible decisions and long-term resiliency plans regarding these challenging topics. The Climate Literacy and Energy Awareness Network (CLEAN, <http://cleanet.org>) is 1) providing teaching resources for educators through the CLEAN Collection and pedagogical support for teaching climate and energy science; and 2) facilitating a professionally diverse community of climate and energy literacy stakeholders, called the CLEAN Network, to share and leverage efforts to extend the reach and effectiveness of climate and energy education. This presentation will provide an overview of the CLEAN web portal and techniques we have used to market it. We will showcase the CLEAN Collection, which is comprised of 700+ resources (curricula, activities, videos, visualizations, and demonstrations/experiments) that have been reviewed for scientific accuracy, pedagogical effectiveness, and technical quality. Recent activities of the CLEAN Network will be highlighted. We will present findings from our web analytics work, which monitors visitor use of the CLEAN web portal. Through analytics data, we will show evidence of successful CLEAN marketing efforts. The results of our recent pop-up survey, which has been completed by CLEAN visitors from six continents, will also be discussed. Survey results will provide detailed information about how our audiences use the web portal. We anticipate that our insights from the CLEAN network can aid other climate and energy education programs in effectively increasing the visibility of their vital work.

Climate Literacy and Energy Awareness Network (CLEAN)

CLEANET.ORG | Building a foundation of support for climate and energy educators

Kathryn Boyd¹, Anne U. Gold¹, Frank Niepold², Patrick Chandler¹, Susan Lynds¹, Amanda Morton¹, Sean Fox³, Monica Bruckner³, Karin Kirk⁴, Tamara Shapiro Ledley⁵, Cheryl Manning⁶

¹Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado Boulder; ²National Oceanic and Atmospheric Administration (NOAA); ³Science Education Resource Center (SERC), ⁴Freelance Science Writer, ⁵STEM Education Consultant, ⁶Science Teacher and Science Education Consultant



CLEAN Review Process

A rigorous and transparent peer-review process is used for the CLEAN collection. Resources that are relevant to one of the climate and energy literacy principles and useful for grade levels K-16 are reviewed. (Gold, A. U., et al. (2012). Peer-review of digital educational resources—A rigorous review process developed by the Climate Literacy and Energy Awareness Network (CLEAN). *Journal of Geoscience Education*, 60(4), 295-308.)

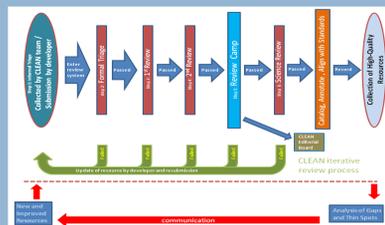
Review Process

Review for: a) scientific accuracy, b) pedagogic effectiveness, c) technical quality/ease of use.

Panel Review: Team of four educators and scientists discusses each resource and makes decision about inclusion in CLEAN.

Expert Science Review: Content expert in the field of the resource reviews for scientific accuracy.

Maintenance Review: Ensures ongoing quality of collection.



CLEAN Supports Climate & Energy Education

CLEAN Collection: Contains 720+ peer-reviewed educational resources such as activities, lab demos, visualizations, and videos for grades 6-16.

Guidance for Teaching Climate and Energy Science: Pedagogical support for teaching climate and energy topics, including misconceptions and best classroom practices.



CLEAN Network: A professionally diverse community of climate and energy literacy stakeholders. Activities:

- Weekly teleconferences and presentations
 - Vibrant email list
 - Workshops and networking opportunities at large events and conferences
- The CLEAN Network is free to join and is open to anyone.

Marketing CLEAN

CLEAN has been working since 2017 to market the CLEAN collection to educators. The efforts involved are:

- Social Media Engagement
- Professional Development Webinars
- STEM Flash Newsletter
- Work with developers
- Syndication with sites like PBS Learning & NSTA
- CLEAN "Selected By" logo
- CLEAN widget on websites
- Presentations at professional conferences
- Teacher Ambassador program
- Targeted outreach to states (media kits)



CLEAN For Educators

Alignment with Next Generation Science Standards (NGSS)

NGSS and CLEAN at a Glance

Clicking the star next to each NGSS Performance Expectation (PE) and Disciplinary Core Idea (DCI) that address climate and energy topics. The table includes links to relevant CLEAN resources. Hovering on the green DCI concept header will display the full text.

Grade Level	CLEAN Resources
Middle School	<ul style="list-style-type: none">Show Middle School - Life Science in CLEANShow Middle School - Physical Science in CLEANShow Middle School - Earth and Space Science in CLEANShow Middle School - Engineering, Technology, and Applications of Science in CLEAN
High School	<ul style="list-style-type: none">Show High School - Life Science in CLEANShow High School - Physical Science in CLEANShow High School - Earth and Space Science in CLEANShow High School - Engineering, Technology, and Applications of Science in CLEAN

1. Each resource has been tagged with:
 - Performance Expectations
 - Disciplinary Core Ideas
 - Science & Engineering Practices
 - Crosscutting Concepts
2. CLEAN Website has guides for creating units aligned to NGSS.

Teaching Guidance

Teaching Guidance is provided following the framework of the Climate Literacy and Energy Literacy Principles. Each page summarizes the relevant **scientific concepts**, provides discussion of what makes the **topic important**, and why it can be **challenging to teach**. Grade-level-specific **teaching strategies** are provided, along with links to relevant **teaching materials** and **reference materials**.

Support for Educators

The CLEAN Network provides support for educators through an active email list, online resource pages, and webinars. Teachers can use these resources to get additional support for teaching complex topics of climate and energy. The community is responsive to requests for input.



CLEAN Collection

The CLEAN Collection is located at cleanet.org and is syndicated to the NOAA Teaching Climate portal, climate.gov/teaching, as the official federal government collection of climate and energy teaching resources.

Search the Collection

Catalog Record

Collection search option:

Open text search – grade level – resource type – Climate Literacy Principles
Energy Literacy Principles – Use of Scientific Data – Regional Focus – Topic areas
Benchmarks of Science Literacy – Guidelines for Excellence in Environmental Sciences
Next Generation Science Standards (NGSS)

Get Involved

- Use teaching resources (collection, guidance, webinars)
- Submit a resource to the collection
- Join the CLEAN Network
- Become a CLEAN Ambassador
- Sign up for the STEM Flash Newsletter
- Become a resource reviewer

Contact: katie.boyd@colorado.edu cleanet.org



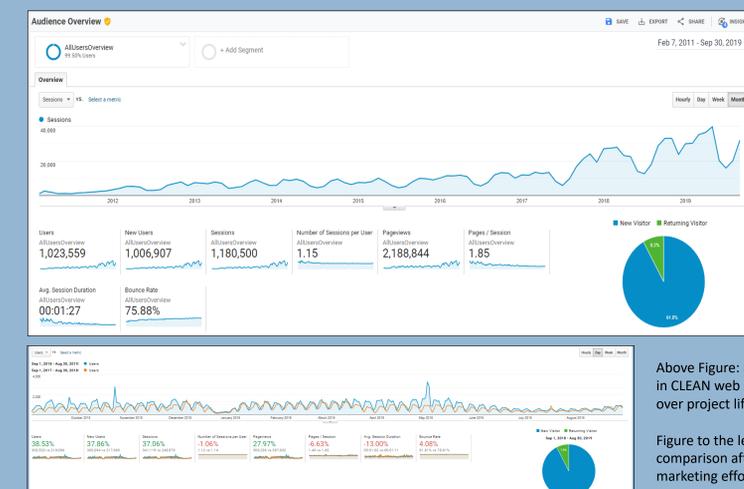
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Web Analytics and Pop Up Survey

CLEAN tracks website traffic through Google Analytics. A popup survey was implemented in summer 2018. Web analytics data show marketing efforts have been successful (see figures below).

- The CLEAN website and the syndicated CLEAN collection site at NOAA's Climate.gov have received over 2,000,000 visits since their creation.
- Monthly average number of sessions increased from about 17,000 in 2014 (when CLEAN was syndicated to Climate.gov) to 57,000 in 2019 (a 335% increase).
- After the 2017 marketing efforts, users, new users, and pageviews increased by about 70% in 2018 compared to 2017.
- Pop up survey respondents reflected CLEAN's target audience of formal and informal educators.
- Pop up survey results showed most new visitors came to CLEAN through a web search. Other referrals came from presentations on CLEAN, a news article about CLEAN, and social media.
- Respondents were mostly looking for educational resources and teaching guidance.



Above Figure: Increase in CLEAN web sessions over project lifetime

Figure to the left: Yearly comparison after marketing efforts